

REMARKS

By the above amendment which accompanies the RCE, claims 1 - 15 have been canceled and new claims 16 - 34 have been presented wherein claims 16, 22 and 28 are independent claims.

In accordance with the present invention, a plasma processing apparatus is provided with, as illustrated in Figs. 1, 3, 4, 5 and 7 of this application with a plate (115, 215) which faces a plasma that is disposed at an upper side of an opposing to a sample which is placed on a sample stage disposed inside of a processing chamber and which an electric power is applied, wherein the plate is coupled to an electric power source which is substantially only one source of an electric field for generating the plasma applied from the upper side of the sample which is disposed inside the processing chamber. Additionally, a dielectric ring member (113 in Figs. 1 and 3, 113A in Fig. 4, 113B in Fig. 5 and 213 in Fig. 7), is disposed at least between a periphery of the plate 115, 215 and a sidewall of the processing chamber and faces the plasma with the dielectric ring member covering at least an outer edge portion of the plate and being contiguous with the sidewall. Furthermore, as illustrated in Figs. 4 and 5, for example, the dielectric ring member at least forms a portion of a ceiling of the processing chamber between the plate and the sidewall. Furthermore, as shown in Fig. 1, for example, the processing chamber is evacuated by an evacuation system 106 which is disposed below the sample stage. Applicants note that the aforementioned features are recited in independent claims 16, 22 and 28 of this application with dependent claims 17 and 23 reciting the feature that the dielectric ring member forms at least the portion of the ceiling of the processing chamber between the plate and the sidewall and such feature being recited in independent claim 28.

The above arrangement enables the plasma processing operation and effect as specifically described in the specification hereof to be realized that the temperature distribution over the surface of the dielectric ring member is optimized so as to reduce the interaction between the plasma and the surface of the processing chamber, or to reduce a bad affect on the sample surface treatment in the outer periphery of the processing chamber above the sample stage. Namely, as with such plasma processing apparatus according to the invention as provided with a plate that is disposed above and opposite to the sample loading surface of the sample stage and to which an electric power for generating a plasma inside the chamber is applied and an electric field being formed within the space between the plate and the sample stage such that the plasma is generated therein, it is important to make the interaction between the surface of the processing chamber facing the plasma and the plasma optimized. Especially, where a surface of the member facing the plasma and constituting the processing chamber regulates a field in which the plasma is generated, such interaction between the surface of such member and the plasma as causing chemical and/or physical action between them and attachment of the charged particles on such surface facing the plasma gives a bad affect on the sample surface.

For example, the surface of the plate disposed above the sample and facing the plasma is positioned near to the sample surface and is directly involved with the generation of the plasma. On the other hand, where the side wall surface of the processing chamber or the internal surface of the chamber disposed between the sidewall and the plate is not in the position of providing an electric field and a magnetic field essential to generate the plasma in such a way that the side wall surface of the processing chamber or the internal surface thereof is positioned

farther from the sample surface, it is considered that an affect on the sample surface brought by the interaction between those surfaces and the plasma is of minor concern. In view of the foregoing, in order to stabilize the sample treatment and improve on the reliability of the plasma processing operation thereon, it is required that an affect on the sample treatment brought by the interaction between the plasma and the internal surface of the processing chamber other than the plate surface be suppressed.

The above arrangement of the plasma processing apparatus according to the invention is intended for reducing bad affect on the sample surface brought by the interaction between the internal surface of the processing chamber, intervening between the plate and the side wall of the chamber, and the plasma. Thus, the plasma processing apparatus according to the invention, is provided with a dielectric ring member which is disposed at least between a periphery of the plate and a side wall of the processing chamber and faces the plasma, wherein the dielectric ring member covers at least an outer peripheral edge portion of the plate, and is contiguous with the side wall. Further, the dielectric ring member at least forms a portion of a ceiling of the processing chamber between the plate and the side wall of the chamber. With such features, the heat of the dielectric ring member caused by the interaction with the charged particles of the plasma incident on the plate surface being conducted to the outer peripheral side of the plate, suppresses the attachment of the particles charged in the plasma on the surface of the dielectric ring member disposed above the sample and to the outer peripheral side of the sample so as to reduce such bad affect on the sample surface resulting from such attachment as the fluctuation of the sample composition caused by the charged particles being attached on a specific part of the ring member during the plasma processing

operation and contamination of the sample surface caused by the attachment of the peeled-off matters on the sample surface.

Further, the plasma processing apparatus according to the invention, has the dielectric ring member disposed between the side wall of the processing chamber and the plate and facing the plasma provided with a substantially flat surface thereof, wherein the dielectric ring member is contiguous to the side wall and forms at least a portion of the ceiling of the processing chamber between the plate and the side wall of the chamber, thereby, interaction between the plasma and the surface of the dielectric ring member at the angular portions of the ring member surface when the ring member is uneven on the surface is eliminated so as to reduce a bad affect on the sample surface caused by such interaction. Applicants note that the attachment of the charged particles of the plasma on such angular portions is increased as compared with the case in which the ring member is flat on the surface, with the result that bad affect on the sample occurs. Such bad affect thereon is suppressed according to the invention by making the surface of the dielectric ring member facing the plasma substantially flat, which dielectric ring member is disposed above the sample and to the outer peripheral side thereof.

Applicants note that the independent and dependent claims of this application recite the aforementioned features, which applicants submit are not disclosed or taught in the cited art as will become clear from the following discussion.

The rejection of claims 1 - 5, 8 - 11 and 14 - 15 under 35 USC 102(b) as being anticipated Ishii et al, US Patent 5,571,366; the rejection of claims 1 - 15 under 35 USC 102(e) as being anticipated by Shamoulian et al, US Patent 6,095,084; the rejection of claims 1 - 15 under 35 USC 102(e) as being anticipated by Collins et al, US Patent 6,024,826; the rejection of claims 1 - 6, 8 - 12 and 14 - 15 under 35 USC

102(e) as being anticipated by Wicker et al, US Patent 6,129,808; and the rejection of claims 6 - 7 and 12 - 13 under 35 USC 103(a) as being unpatentable over Ishii et al, US Patent 5,571,366 in view of Collins et al, US Patent 6,024,826 or Shamouilian et al, US Patent 6,095,084; such rejections are traversed insofar as they are applicable to the present claims and reconsideration and withdrawal of the rejections are respectfully requested.

As to the requirements to support a rejection under 35 USC 102, reference is made to the decision of In re Robertson, 49 USPQ 2d 1949 (Fed. Cir. 1999), wherein the court pointed out that anticipation under 35 U.S.C. §102 requires that each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference. As noted by the court, if the prior art reference does not expressly set forth a particular element of the claim, that reference still may anticipate if the element is "inherent" in its disclosure. To establish inherency, the extrinsic evidence "must make clear that the missing descriptive matter is necessarily present in the thing described in the reference, and that it would be so recognized by persons of ordinary skill." Moreover, the court pointed out that inherency, however, may not be established by probabilities or possibilities. The mere fact that a certain thing may result from a given set of circumstances is not sufficient.

With regard to the requirements to support a rejection under 35 USC 103, As to the requirements to support a rejection under 35 USC 103, reference is made to the decision of In re Fine, 5 USPQ 2d 1596 (Fed. Cir. 1988), wherein the court pointed out that the PTO has the burden under '103 to establish a prima facie case of obviousness and can satisfy this burden only by showing some objective teaching in the prior art or that knowledge generally available to one of ordinary skill in the art

would lead that individual to combine the relevant teachings of the references. As noted by the court, whether a particular combination might be "obvious to try" is not a legitimate test of patentability and obviousness cannot be established by combining the teachings of the prior art to produce the claimed invention, absent some teaching or suggestion supporting the combination. As further noted by the court, one cannot use hindsight reconstruction to pick and choose among isolated disclosures in the prior art to deprecate the claimed invention.

Furthermore, such requirements have been clarified in the recent decision of In re Lee, 61 USPQ 2d 1430 (Fed. Cir. 2002) wherein the court in reversing an obviousness rejection indicated that deficiencies of the cited references cannot be remedied with conclusions about what is "basic knowledge" or "common knowledge".

The court pointed out:

The Examiner's conclusory statements that "the demonstration mode is just a programmable feature which can be used in many different device[s] for providing automatic introduction by adding the proper programming software" and that "another motivation would be that the automatic demonstration mode is user friendly and it functions as a tutorial" do not adequately address the issue of motivation to combine. This factual question of motivation is immaterial to patentability, and could not be resolved on subjected belief and unknown authority. It is improper, in determining whether a person of ordinary skill would have been led to this combination of references, simply to "[use] that which the inventor taught against its teacher."... Thus, the Board must not only assure that the requisite findings are made, based on evidence of record, but must also explain the reasoning by which the findings are deemed to support the agency's conclusion. (emphasis added)

With regard to the rejections under 35 USC 102, applicants submit that irrespective of the position set forth by the Examiner, none of the cited art discloses in the sense of 35 USC 102 or teaches in the sense of 35 USC 103, the recited features of independent claims 16 and 22 of at least the features of a plate facing

the plasma which is disposed at an upper side with respect to the sample stage and opposing to a sample loading surface of the sample stage, wherein the plate is coupled to an electric power source which is substantially only one source of an electric field for generating the plasma applied from the upper side of the sample
which is disposed inside the processing chamber, and that a dielectric ring member disposed at least between a periphery of the plate and the sidewall of the processing chamber and facing the plasma is provided, wherein the dielectric ring member covers at least an outer edge surface of the plate and is contiguous with the side wall
or the features of independent claim 28 which recite the same features concerning the plate and that the dielectric ring member is disposed at least between the dielectric ring member is disposed at least between a periphery of the plate and a sidewall of the processing chamber, wherein the dielectric ring has a substantially flat surface facing the plasma, the dielectric ring member being contiguous with the sidewall and forming at least a portion of a ceiling of the processing chamber between the plate and the sidewall. It is noted that dependent claims 17 and 23 which recite the feature of the dielectric ring member forming at least a portion of the sealing of the processing chamber between the plate and the sidewall.

Turning to Ishii et al, while the Examiner utilizes the language as previously recited from the claims of a dielectric member disposed with respect to an outer periphery of the antenna with the member being ring-shaped and heated, it is not seen what structure the Examiner is referring to. More particular, assuming, arguendo, that the Examiner is referring to the annular projection 29 as described in column 6, lines 13 - 16 of Ishii et al as a dielectric member, it is not seen that such represents a dielectric ring member nor is disposed at least between a periphery of the plate, whatever the plate may be in Ishii et al, and a sidewall of the processing

chamber with the dielectric ring member covering at least an outer edge surface of the plate and being contiguous with the sidewall or the dielectric ring member being contiguous with the sidewall and forming at least a portion of a ceiling of the processing chamber between the plate and the sidewall. Thus, applicants submit that the recited features of independent claims 16, 22 and 28 and the dependent claims thereof patentably distinguish over Ishii et al in the sense of 35 USC 102 or 35 USC 103.

As to Shamouilian et al, while the Examiner refers to a dielectric member 145 it is not seen that the member 145 which is described in column 7, line 48 of Shamouilian et al as a primary bias electrode 145 is a dielectric ring member, as claimed, in each of independent claims 16, 22 and 28, nor that the dielectric ring member is disposed at least between a periphery of the plate (it being noted that Shamouilian et al does not disclose a plate arranged in the manner defined) and a sidewall of the processing chamber and facing the plasma, wherein the dielectric ring member covers at least an outer edge surface of the plate and is contiguous with the sidewall or that the dielectric ring member is contiguous with the sidewall and forms at least a portion of a ceiling of the processing chamber between the plate and the sidewall. Thus, applicants submit that the features as recited in independent claims 16, 22 and 28, are also not disclosed or taught by Shamouilian et al in the sense of 35 USC 102 or 35 USC 103 and the independent claims and the dependent claims patentably distinguish thereover.

With regard to Collins et al, the Examiner refers to a dielectric member 152 disposed with respect to an outer periphery of the antenna and applicants note that Collins et al describes the cylindrical chamber 140 as consisting of a cylindrical sidewall 150 and a circular ceiling 152 in which the sidewall 150 and the ceiling 152

can constitute a single piece of material such as silicon. With such construction, it is readily apparent that the member 152 is not a dielectric ring member disposed in the manner set forth so as to cover at least an outer edge surface of the plate arranged in the manner defined and disposed at least a periphery of the plate and a sidewall of the processing chamber and being contiguous with the sidewall, as recited in independent claims 16 and 22, or the dielectric ring member being disposed at least between a periphery of the plate and the sidewall of the processing chamber wherein the dielectric ring member has a substantially flat surface facing the plasma and the dielectric ring member is contiguous with the sidewall and forms at least a portion of a ceiling of the processing chamber between the plate and the sidewall. Additionally, while the Examiner refers to the member 63 which is described as an inner polymer-hardening precursor ring as shown in Fig. 8A, for example, of Collins et al, it is readily apparent that such does not conform to the claimed features of claims 16, 22 and 28 and therewith, the dependent claims of this application in the sense of 35 USC 102 or 35 USC 103. Thus, applicants submit that the independent and dependent claims also patentably distinguish over Collins et al and should be considered allowable thereover.

With respect to Wicker et al, the Examiner refers to a dielectric member 122 and a member 130. Irrespective of this position by the Examiner, member 122 is disclosed as a ceramic window 122 which sits above the gas distribution plate 120 and has an RF coil system 120 (i.e., an RF antenna) arranged thereabove. Thus, it is readily apparent that the ceramic window 122 is not a dielectric ring member, as claimed, arranged in position with respect to a plate, as claimed, with the dielectric ring member disposed at least between a periphery of the plate and a sidewall of the processing chamber, covering at least at outer surface of the plate and being

contiguous with the sidewall, as recited in claims 16 and 22, or being disposed at least between the periphery of the plate and the sidewall and the dielectric ring member being contiguous with the sidewall and forming at least a portion of the ceiling of the processing chamber between the plate and the sidewall, as recited in independent claim 28. Thus, applicants submit that the independent and dependent claims of this application patentably distinguish over Wicker et al in the sense of 35 USC 102 and 35 USC 103 and should be considered allowable thereover. As to member 130, such is described as a chamber liner 130 in Wicker et al and does not provide the claimed features.

As to the combination of Ishii et al, Collins et al and Shamoulian et al under 35 USC 103, applicants submit that as pointed out above, the independent claims patentably distinguish over the references and none of the references provide the features of the independent claims, such that the combination also fails to provide the recited features of the independent claims and the dependent claims of this application. Accordingly, applicants submit that all claims present in this application patentably distinguish over the cited art in the sense of 35 USC 102 and 35 USC 103 and all claims should be considered allowable thereover.

In view of the above amendments and remarks, applicants submit that all claims present in this application recite features not disclosed or taught in the cited art taken individually or in any combination thereof, such that all claims patentably distinguish over the cited art and should now be in condition for allowance.

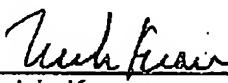
Accordingly, issuance of an action of a favorable nature is courteously solicited.

To the extent necessary, applicants petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to the deposit account of Antonelli,

Terry, Stout & Kraus, LLP, Deposit Account No. 01-2135 (Case: 520.34403C12),
and please credit any excess fees to such deposit account.

Respectfully submitted,

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